

protecting the oceans

land resources

waste management

protecting the atmosphere

biological diversity

freshwater resources

biotechnology

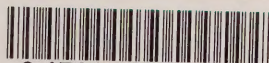
environment and development



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# On the road to Brazil



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# Environment and Development

## Our Common Future

A few years before the UN General Assembly issued its call for the UNCED, it had asked a group of 21 respected men and women drawn from various walks of life and all parts of the world to examine the twin issues of environmental degradation and economic development. After months of work under the leadership of Gro Harlem Brundtland, the Prime Minister of Norway, this World Commission on Environment and Development presented its report, *Our Common Future*, to the General Assembly in 1987.

The Commission declared that the environment — where we all live — and development — “what we all do in attempting to improve our lot within that abode” — are inseparable. The key to a harmonious balance between the two is “sustainable development”: the concept that nature must be used “on a basis that can be sustained into the distant future”.

Sustainable development was launched as a concept in 1981 with the publication of the World Conservation Strategy report by three international organizations: the UN Environment Programme (UNEP), the International Union for the Conservation of Nature and the World Wildlife Fund. The Strategy recognized that the planet's capacity to support people is being undermined by poor land management, profligate use of resources and the sort of grinding poverty that forces people to destroy the very resources they need to survive.

Jim MacNeill, the Canadian who served as Secretary-General to the Brundtland Commission, has observed, “Sustainable development means the kind of economic development that lives off the Earth's interest, without encroaching on its capital. It also means investing to sustain and even enhance our ecological capital, so that future dividends can be ensured and enlarged”. In order to achieve this kind of balance, certain fundamental issues must be addressed by the UNCED. These include the relationships between and among population growth, urbanization, poverty, human health, the environment and the quality of life.

## Population Growth and Poverty

World population has been growing steadily for centuries, but in recent times it has increased at a much faster rate than before. Around 1850 the world's population reached 1.2 billion. By 1950 — roughly a century later — it had doubled. Only four decades later, global population had more than doubled again, reaching 5.16 billion in 1989.

In fact, during the past decade, most countries' population growth rates have started to fall. But because a large portion of the population is in its reproductive years, even these countries are continuing to grow rapidly. Such rapid growth puts extraordinary pressure on food supply, land use, and the natural resource base — forests, soils, water and fisheries — in short, on virtually every aspect of the environment. A vicious cycle is created in which the interconnections between too many people, too little land and too few resources are so intricate and complex that it is difficult to distinguish cause from effect.



### Environmental Refugees

Among the many results of environmental bankruptcy is the phenomenon of environmental refugees who flee from land whose productivity has deteriorated beyond the point where it can support them. No one has reckoned the number of environmental refugees worldwide, but hundreds of thousands of people were displaced from the Sahel alone during the recent prolonged drought. Many headed for nearby cities, some of which are growing 10–20% each year. Most environmental refugees end up in sub-standard shantytowns on the edges of cities, in “transit” camps that become permanent fixtures on the landscape (and that depend on regular outside relief), or in other rural areas, where the newly increased level of demand leads to further degradation.<sup>4</sup>

### Structural Adjustment

In recent years, the difficulties of many developing country governments in coping with the spiralling demands of rapid population growth, poverty and environmental degradation have been compounded by the impact of structural adjustment programmes. Much of the developing world has been left with little alternative to adopting austere adjustment programmes as a condition of financial support from the International Monetary Fund and the World Bank in an effort to stave off balance of payments crises, meet debt obligations, and lay the foundation for growth.

Typical measures in an adjustment package include currency devaluation, removal of subsidies on staple foodstuffs, and deep cuts in government spending, often on social services. Inevitably, the cuts in social spending have resulted, at least in the short term, in less affordable food, medicine and education for much of the population in the Third World. There is evidence that poverty levels have increased in many countries under structural adjustment programmes.<sup>5</sup>

### Urbanization

Urban areas in most developing countries are growing rapidly. The urban population of the Third World now stands at 1.3 billion and is expected to grow by nearly another billion by the year 2005.<sup>6</sup> It is estimated that by the year 2000, 47% of the world population will be urban. In more developed countries, nearly 75% will be urbanized, while only in Africa and south Asia will less than half the population reside in urban areas.<sup>7</sup>

Urbanization usually accompanies economic development. The populations of most of the developed countries were over 60% urban in 1985. By contrast, of the nine countries with less than 10% of their population living in urban areas, seven had a Gross National Product (GNP) per capita of less than U.S. \$600. Similarly, within developing countries, rural dwellers tend to be poorer than their urban counterparts and are more likely to lack access to drinking water, sanitation, and other services.

Certainly, poverty and underdevelopment abet rapid population growth. “Who has the largest families?” asked the late Indian Prime Minister Indira Gandhi, and replying to her own question, said, “the poor, and they look at the child as an extra pair of hands.” Children are often an important source of income through their work within or outside the home. Later on as adults, they offer a social safety net for their aging parents that most governments of poor countries are simply unable to provide.

At the same time, rapid population growth also leads to poverty. There are more hungry people today than ever before. In 1980, 340 million people in 87 developing countries were not getting enough calories to prevent stunted growth and serious health risks. In terms of sheer numbers, this represented a 14% increase over 1970.<sup>1</sup> More recently, the World Bank estimated that 950 million people still consumed too few calories to support an active working life.<sup>2</sup>

Poverty itself pollutes the environment. Africa is the most tragic example of environmental bankruptcy where because of inappropriate policies and practices too much was taken from the land. The outcome, as the famine of the 1980s demonstrated, was disaster. The Brundtland report noted:

Those who are poor and hungry will often destroy their immediate environment in order to survive: They will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities. The cumulative effect of these changes is so far-reaching as to make poverty itself a major global scourge.<sup>3</sup>



Unfortunately, these services are also often unavailable in the expanding urban slums, where many people who migrate from rural areas settle. The perception that urban areas offer greater opportunities has resulted in a tide of urban migration, putting incredible pressure on city governments to provide services which are already stretched thin. An estimated 40% of the urban population in less developed countries lives in slum and squatter areas with minimal housing and services. By the end of this century, the World Bank estimates that more than half the households in developing countries living in absolute poverty — that is, in or near subsistence — will be concentrated in urban areas.

Yet a report by the UN Development Programme has observed: "Few governments have effective programmes to reduce urban poverty, leaving the poor to fend for themselves — to provide their own shelter, to find their own work in the informal sector and even to grow their own subsistence and market foodcrops."<sup>8</sup>

Cities are often centres of innovation. They transform resources into productive goods and services that contribute strongly to national economic production. Although agriculture is still the major employer in many developing countries, only in a few countries does it contribute more than half the gross domestic product (only seven in 1985, all among the poorest). Cities contribute to economic growth by providing economies of scale and proximity that allow industry and commerce to flourish, by supporting modern social services and production facilities that generate employment, and by offering a wide variety of commercial and personal services unavailable elsewhere.

Large cities are important markets for agricultural goods. Their continued growth intensifies rural land use in surrounding areas, increasing pressure to change crop mixes and characteristics and promoting more intensive agriculture. Many of these changes increase agricultural productivity and raise the

incomes of farmers living on the periphery of cities. But as the Food and Agriculture Organization (FAO) points out, "urban growth feeds on many of the same inputs and resources that are essential to agriculture" and it is especially competitive with agriculture for the use of arable land.

In particular, *rapid* urbanization can be a curse. Megacities especially have created serious social, economic and physical problems in some developing countries. Many have economic bases too weak to absorb the vast numbers of workers joining the labour force. Congestion and high density living promote air and water pollution and physical deterioration. Among the problems are the following:

- untreated domestic sewage and sediments and toxic materials seeping into rivers and bays severely damages aquatic life;
- urban growth on ecologically fragile land can create serious physical problems — parts of Bangkok are sinking at faster rates than Venice, during its worst period, due to overuse of groundwater;
- solid waste disposal remains a terrible problem — many cities simply leave it to decompose or dump it untreated;
- air quality standards are far worse than those of developed countries and well below internationally accepted standards for good health: coal and wood burning is widespread; more lax standards for automobile emissions and polluting industries.

During the 1970's, governments tried various approaches to contain rapid urbanization. Many have sought to create a more balanced distribution of urban population in secondary cities and towns dispersed broadly throughout the country. Often these approaches were stillborn because they failed to recognize the basic problem was poverty and they failed to make use of the potentialities of the communities.

Gradually, a new approach, the "enabling strategy" evolved, which draws on the essential resourcefulness of people. It

aimed to make things easier for the people to improve their shelter conditions, for example, on their own. This new philosophy is one of the basic principles of the UN's Global Strategy for Shelter to the Year 2000, which was adopted by the UN General Assembly in 1988 and is now being applied by many different countries. The Strategy:

- aims for shelter for all by the year 2000;
- promotes an enabling approach whereby governments enable the people to improve their shelter situation themselves, by making it easier to:
  - obtain security of tenure and other legal requirements,
  - work with appropriate building codes,
  - have access to finance for housing, and
  - have access to low-cost building materials;
- harnesses the energies and skills of the people themselves to improve their homes through the enabling approach involving the participation of the community, especially women.

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## Human Health and the Quality of Life

Health is a basic human need and integral to the quality of life. The relation of health to sustainable development is reciprocal: sustainable development depends on the good health of productive people, while the protection of health by meeting basic health needs such as food, drinking water and shelter ultimately involves the sustainable use of natural resources. It also requires the control of endemic diseases in relation to development, improvements in the working environment, the prevention of environmental health risks, and the protection of specific groups such as mothers and children.

The leading causes of death provide a sharp contrast between the developing and developed countries. In the developing world, infectious and parasitic diseases cause 40% of all deaths. By contrast, cardiovascular diseases account for half the deaths in industrialized countries — twice as many as cancers, the second major cause of death.

Despite adequate food supplies at the global level, hunger and malnutrition are a leading health problem in the developing world. An estimated 950 million people — nearly 20% of the world population — do not consume enough calories for an active working life. Moreover, calories and protein supplies are on a downward trend in sub-Saharan Africa and southern Asia.

The most common tropical diseases are water related — caused by the absence of potable water and adequate sanitation or transmitted through insects and parasites. In the developing world, 80% of all illness is attributed to unsafe and inadequate water supplies and sanitation.

Measures to reduce these diseases are obvious. They include improvement of water quality and quantity, sanitation and sewage disposal practices, and protecting water sources from contamination. According to the World Health Organization (WHO), over 1 billion people need adequate and safe water, and over 1.5 billion need adequate sanitation.<sup>9</sup>

At the same time, education is another prerequisite for positive health and population conditions. In particular, the education of women can have a multiplier effect since it is a critical force in improving women's status as well as the survival of their children. It helps women gain the knowledge and confidence to make use of available health services for their children and themselves and is an important factor in reducing fertility rates. Unfortunately, the education of females lags behind that of males in many developing countries.

One area where such education has already had a significant impact is in the use of contraceptives. Contraceptive use allows women greater control over their fertility and, by enabling child spacing and preventing unwanted births, can reduce both maternal and child mortality rates. Contraceptives are used increasingly throughout most parts of the world, with Africa a notable exception. Many governments promote contraceptive programmes as one means of reducing population growth and its demands on social and environmental resources.

## The AIDS Pandemic

Since it was first identified in 1981, AIDS (acquired immune deficiency syndrome) has spread rapidly throughout the world. By the end of 1987, 129 nations had reported a cumulative total of 73,000 cases to WHO. Seventy-five per cent of these were in North and South America. However, AIDS cases are grossly under-reported in many parts of the world, particularly Africa and Latin America. WHO estimates that about 150,000 cases may have occurred since the beginning of the worldwide pandemic.

AIDS is caused by a retrovirus — the human immunodeficiency virus (HIV). An estimated 5–10 million people are carriers of HIV. Although many will not develop symptoms of the disease until several years after they are infected, recent studies suggest that virtually all individuals infected with HIV go on to develop AIDS.

The costs of AIDS in developing countries is likely to be high. Unlike many diseases that favour the old or the young, AIDS

primarily strikes young and middle-aged adults, 20–49 years old, the most vital segment of the population. The potential loss of a sizeable share of this population raises the possibility of social, economic and even political destabilization.

Prevention is the only known way to stop the spread of AIDS since a vaccine is not expected until the mid-1990's at the earliest. WHO has created a special programme to provide technical and financial support to strengthen the 150 national AIDS committees. Many countries have prepared short-term plans for prevention and control programmes and some have completed three- to five-year plans.<sup>10</sup>

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## Child Health

In developing nations, 14–15 million children under the age of five die every year from diarrhea, measles, and other diseases frequently associated with poverty, overcrowding and malnutrition. About 60% of childhood diarrheal deaths result from acute dehydration that can be prevented with good nutrition and oral rehydration therapy (ORT) — the ingestion of a simple solution of water, salts, and carbohydrates (e.g., sugar, rice powder). WHO estimates that ORT saves half a million children from death each year. International and national efforts to increase ORT usage are on the rise. By the end of 1987, more than 100 countries had begun national programmes. However, the therapy is still not in widespread use: only 8% of children in Africa and 23% in Asia have access to centres dispensing ORT.

WHO and the United Nations Children's Fund (UNICEF) have begun a global campaign to immunize all children against six target diseases: tetanus, measles, polio, diphtheria, pertussis, and tuberculosis. Immunization programmes have largely eliminated these diseases from industrialized countries, but they continue to claim an estimated 3.5 million children's lives in developing countries, while leaving an equal number blind, crippled or mentally retarded.<sup>11</sup> UNICEF estimates that, if progress can be maintained, the 1980 figure of almost 5 million child deaths a year from vaccine-preventable diseases could be reduced to perhaps 250,000 or less by the year 2000.<sup>12</sup>

## UN Efforts

The United Nations system, particularly the WHO, but also a variety of other UN agencies such as UNICEF and UNFPA (the UN Fund for Population Activities) are concerned with the linkages between health, environment and development.

They have been working hard to ensure that basic health needs are met and that people are protected against environmental health risks which originate with the development process itself. In the spring of 1990, the WHO established a Commission on Health and Environment in order to conduct a comprehensive review and assessment of the consequences to human health of present and predicted environmental factors associated with socioeconomic development. Four separate expert panels address "developmental driving forces" on energy, urbanization, food and agriculture, and industry — and their impacts on health.

Work has been proceeding on developing internationally agreed food standards and maximum residue levels for pesticides and other agro-chemicals, and on establishing maximum levels for environmental contaminants. This is being conducted by the Joint WHO/FAO *Codex Alimentarius* Commission. Environmental health management is also being addressed through world-wide networks which are being set up by WHO for education, training and research in environmental health. These networks will be used for the purpose of strengthening local capacities in education, training and research on environmental pollution and related health problems.

## Health Issues at UNCED

Among the gaps which remain and which the UNCED should address are the following:

- insufficient integration, nationally and internationally, between health, development and environmental policies, institutions and activities;
- insufficient linkages among health, environment, human settlements and development-related institutions, at the national level;
- lack of epidemiological information from developing countries on health effects of environmental hazards;
- insufficient attention paid to monitoring and assessing the impact of pesticides, fertilizers and industrial activities on human and environmental health;

- development of an economically efficient integrated pest management system package adapted to local agro-ecological and socioeconomic conditions in rural areas;
- insufficient information, monitoring, assessment and evaluation of impacts of development actions and hazards on health;
- worldwide harmonization of health-related standards.

The major challenge of the 1992 UN Conference on Environment and Development will be to harmonise the needs of the poor with the long-term requirements of a sustainable world. Among the relationships that are expected to be addressed are the following:

- 1) the relationship between poverty and environmental degradation;
- 2) the relationship between demographic pressures, unsustainable consumption patterns and environmental degradation;
- 3) the relationship between the lack of economic growth in most developing countries and the degradation of the environment;
- 4) the relationship between inappropriate patterns of growth and development and the degradation of the environment;

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- 5) the relationship between the external indebtedness of developing countries, the phenomenon of net transfers of resources from developing to developed countries and their ability to contribute fully and in accordance with their capacities and responsibilities to global efforts to protect and enhance the environment;
- 6) the relationship between the international economic climate, including the need to reverse the terms of trade when these are unfavourable to developing countries, and the degradation of the environment;
- 7) the relationship between environment, development and market mechanisms;
- 8) the relationship between economic and social conditions at the national and international levels and the protection of the environment.

### Development Issues at the UNCED

Specific areas of action include the following:

- improve coordination of work in the UN system on the eradication of poverty and improvement of the living and working environment;

- involve NGOs in implementation of more effective, community-level programmes and increase funding of their work;
- incorporation and adaptation of environmental impact assessment techniques to agricultural and rural development;
- assessment of the environmental impacts of structural adjustment on agriculture and rural development;
- development of sustainable water supply and sanitation policies, and of programmes for recycling of solid wastes;
- promotion and exploitation of the self-reliant capacity of communities to improve services, attitudes and environmental conditions that are important to health.

A great uncertainty about the Brazil Conference is whether critical linkages will be made between environment and development issues. There has been a strong tendency, particularly in the United States, to treat the UNCED strictly as a conference about environment, with little reference to fundamental and abiding questions of poverty and inadequate development that afflict much of the Third World. The necessary synthesis — sustainable development — remains more a slogan than a working proposition.

The challenge of Brazil will be to make the concept of sustainability and sustainable development a vital reality both of planning and practice in every part of the world.

### Endnotes

- 1 The World Commission on Environment and Development, *Our Common Future*, 1987, p. 29.
- 2 The World Resources Institute and the International Institute for Environment and Development, *World Resources 1988-89*, New York, p. 51.
- 3 *Our Common Future*, op. cit., p. 28.
- 4 *World Resources 1988-89*, op. cit., p. 228.
- 5 See for example, "Engendering Adjustment for the 1990s", Report of a Commonwealth Expert group, 1989, pp. 68-71.
- 6 United Nations Development Programme, *Human Development Report 1990*, p. 85.
- 7 *World Resources 1988-89*, op. cit., p. 37.
- 8 *Human Development Report*, op. cit., p. 85.
- 9 *World Resources 1988-89*, op. cit., pp. 25-6.
- 10 *World Resources 1988-89*, op. cit., pp. 27-8.
- 11 *ibid.*, p. 26.
- 12 UNICEF, *The State of the World's Children*, 1989, p. 3.

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#### issue 1 Environment and Development

The living and working conditions of the poor and human health and the quality of life.

#### issue 2 Protecting the Atmosphere

Protection of the atmosphere by combating climate change, depletion of the ozone layer and transboundary air pollution.

#### issue 3 Protecting the Oceans

Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and of coastal areas, and the protection, rational use and development of their living resources.

#### issue 4 Waste Management

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#### issue 6 Biological Diversity

Genetic resources, wildlife areas, and biological diversity.

#### issue 7 Freshwater Resources

Protection of the quality and supply of freshwater resources.

#### issue 8 Biotechnology

Environmentally sound management of biotechnology.

This issue paper is part of a series, "Notes on the Road to Brazil," which seeks to inform Canadians about the key issues that will be under negotiation at the forthcoming United Nations Conference on Environment and Development (UNCED), to be held in Brazil in June 1992. The series is published by the United Nations Association in Canada under the general editorship of Gregory Wirick, an Ottawa-based writer and consultant on international issues. The views expressed in this series do not necessarily reflect those of the United Nations Association in Canada. Additional copies may be purchased from the UNA-Canada, 63 Sparks Street, Suite 808, Ottawa, Ontario K1P 5A6. ©

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The consequences would be immense. They would include a substantial rise in sea level which would be catastrophic for low-lying areas, especially if coupled with greater probability of storm surges. Caribbean islands depend heavily on their beaches for employment and foreign exchange. Yet their beaches average only 20 meters in width and will withdraw by one meter for every centimeter rise in sea levels. Other countries could lose coastal areas containing much of their population and economic wealth. Some islands would be threatened by extinction.<sup>3</sup>

Global warming would also increase the likelihood of droughts and, therefore, of desertification in agricultural areas the world over. On the other hand, it could encourage agriculture to migrate closer to the poles as summer growing seasons lengthened.

Another threat to the earth's atmosphere is air pollution which knows no national boundaries or regional constraints. Air pollutants are killing trees and lakes and damaging buildings and cultural treasures, sometimes thousands of miles from their source.

Acid rain has been a point of controversy between Canada and the United States for several years. It is also a serious problem in Europe, causing particular devastation to forests. Fifty million hectares or 35% of Europe's forests are estimated to be damaged, dead or dying.<sup>4</sup>

Global warming, ozone depletion and air pollution all arise from the same causes: the growth of human population and wealth. They are rooted in industrialization, technological change, energy dependence, striving for economic growth, and a multitude of other ways in which humans try to improve their quality of life.

### Progress on Ozone

"The ozone hole is the smoking gun," which provides "real proof that humans threaten life on earth," remarks Michael Oppenheimer, a senior scientist at the Environmental Defense Fund in the United States.<sup>5</sup> Because of the potentially disastrous consequences of ozone depletion, there has been a relatively swift policy response to man-made chlorofluorocarbons (CFCs) and other substances (e.g., fire-extinguishing chemicals called halons) that are major contributors to depletion of the ozone layer.

Yet even the progress on ozone depletion has taken well over a decade to achieve. In part because of the limitations of the scientific data, it was 1985 before the first convention to deal with ozone depletion

was achieved. Since then, increasing concerns about the rapidity of ozone depletion led in 1987 to the *Montreal Protocol on Substances that Deplete the Ozone Layer*, which called for 50% reductions in CFC emissions by the year 2000. It came into effect on January 1, 1989, but the ink was barely dry before nations began meeting again in order to try to strengthen its provisions.

The result was a still more drastic accord that 93 nations signed in London in June 1990. They committed to phasing out completely the production and use of CFCs by the year 2000, although developing countries are given a 10-year grace period, obliging them to halt production before the year 2010. In addition, the new agreement called for a ban on halons by 2000, while two other chlorine-based chemicals are to be sharply restricted.<sup>6</sup>

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Most significant of all, a new international body was created to administer a fund that will be used to help poor countries make the transition to technologies free of CFCs. The new fund — of up to U.S.\$240 million for the first three years — is being financed by industrialized countries; its establishment brought major developing countries like China and India — which had not agreed to sign the Montreal Protocol — into accepting the provisions of the revised protocol and recommending its ratification by their respective governments.

The results of the London Conference will have a major influence on other negotiations on atmospheric protection — and there are plenty of them. Many hope that the experience with ozone depletion may serve as a model for other negotiations on climate change. The key question is whether the richer countries are willing to assist developing countries with financing and technology transfer at less than commercial cost in order to ensure strong programmes of prevention.

### Ozone Depletion Issues

Among the key outstanding issues which UNCED will be expected to address are the following:

- finding ways and means of monitoring compliance with existing international conventions and agreements;
- finding ways of ensuring technology transfer to assist developing countries to meet global standards for ozone depletion, including intellectual property rights and ways of involving industry.

### Meeting the Challenge

The challenges of global warming, ozone depletion and transboundary air pollution reflect, in essence, a conflict between two vast and complex systems: the planet's ecological system and the human socio-economic system. The momentum of these systems already guarantees some change, although how much remains uncertain. But delays will almost certainly ensure that the effects are greater and last longer.

Our knowledge of the main global weather processes is considerable. It has permitted the construction of "general circulation models", using supercomputers, which give indications of the global climate to be expected if greenhouse gases double during the next half century. However, these models remain at an early stage of development and the complexity of the weather system is such that some effects are more dependable than others. For example:

forecasts in changes in sea level are probably more reliable than those of the climate of land areas; estimates of air temperature are more reliable than estimates of precipitation; and forecasts of latitudinal (North-South) changes are more reliable than attempts to predict the changes from East to West across a continent.<sup>7</sup>

These variations do not diminish the significance of the circulation models, but they do highlight the difficulties of basing policy on predictions of climate that remain speculative. The only justification

for doing so is the enormity of the problems we face. Fundamentally, climate change is being caused by the developed countries and the solution must come from them. One expert has argued, "a prudent course is to take some action early in the hope of cutting off the worst possible outcomes. The imprudent is to do nothing, awaiting a more complete confirmation of the models."<sup>8</sup>

Another complication is the profound difference between developing and industrialized countries in both causes and consequences. Today, the developed world accounts for about one-third of greenhouse gas emissions but, as population and economic development increase, its contribution will swell. Yet reducing greenhouse gases is a priority among many developing countries. Some countries see themselves as benefiting from warming, benefiting from more productive growing conditions. Even if developing countries do not face the gravity of the challenge, they need substantial monies, skilled labour and advanced technology in order to meet their targets.<sup>9</sup>

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Their involvement is crucial. Any reductions in fossil fuel emissions by industrialized countries could soon be wiped out by increases in only a handful of developing countries. China alone, with one of the largest reserves of coal in the world, plans 200 new coal-fired stations in the future. "The problem is not that [developing countries] can prevent an agreement being reached, but that they can refuse to sign, ratify or implement an agreement unless and until their economic and other concerns have been addressed."<sup>10</sup>

### What Will the Brazil Conference Do?

The leaders of the Group of Seven leading industrial countries, at the Paris Summit of July 1989, declared in their final communiqué that "the conclusion of a framework or umbrella convention on climate change to set out general principles or guidelines is urgently required."

Anticipating their concerns, two UN agencies (the World Meteorological Organization and the UN Environment Programme) set up in 1988 the Intergovernmental Panel on Climate Change (IPCC) with a mandate to provide a firmer assessment of the scientific basis for climate change. The IPCC established three sub-groups, each of which prepared reports for the second World Climate Conference in Geneva in the fall of 1990. Among their findings was that emissions of greenhouse gases, if left uncontrolled, would result in global mean temperature increases of up to three degrees Celsius and sea level rises of up to three quarters of a metre by the end of the next century.

Negotiations to discuss an international convention on climate change opened in Washington, D.C. in February 1991 under the auspices of the UN General Assembly. The theory is that a framework convention would contain appropriate commitments for action to combat climate change and its adverse effects and would consider the particular needs and development priorities of developing countries to assist them in grappling with the threats of climate change and participating in the solutions. This would be followed as soon as possible by protocols that could include more obligations (i.e., targets and timetables).

### Climate Change Issues

Among the issues that UNCED or negotiations leading up to or parallel with UNCED will need to address are the following:

- an appropriate global warming index, with practical limits which still minimize risks;
- establishing global and fair national targets based on the index. This will require estimating each country's emissions for a baseline year;
- evaluating whether and how credits should be given to national governments for actions taken prior to when the convention enters into force — for example, reforestation, CFC reductions, perhaps even nuclear power if that is considered appropriate;
- assessing the needs of developing countries;
- evaluating alternative administrative and enforcement mechanisms. This could include a system of international emissions trading by which different companies have the choice of achieving emission reductions in greenhouse gases either at their own facilities or by purchasing allowances from other companies, whichever is more economical.

### Transboundary Air Pollution Issues

The major issues include:

- broadening participation by more countries in existing legal agreements or facilitating new regional agreements beyond those in North America and Europe — this may be preferable to "globalizing" existing ones;
- seeking technologies for cutting down air pollution and improving the harmonization worldwide of currently-existing technical emission standards;
- promoting new strategies for energy efficiency and rational energy use and eliminating economic incentives and subsidies for fossil fuels.

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## The Challenge Remains

Meeting the challenge of global warming will not be easy. The uncertainties of predictions make consensus difficult to reach. Indeed, reaching any kind of agreement will depend on the answers to two big questions: 1) When it comes to emission reductions, who should be how virtuous? and 2) How are developing countries who sign going to be compensated?

In the first instance, energy-efficient countries like Japan will be reluctant to make the same percentage cuts as inefficient ones like Canada. Britain has announced a later date for stabilizing its emissions (2005) than its partners in the European Community (2000). Nor can Third World countries all be treated alike. Some, such as Brazil with its burning forests, send up a huge amount of greenhouse gases; others hardly any. Even agreeing on the figures of who emits how much will be difficult because of the complexity of the calculations. Yet the reality is that the major commitment must come from developed countries whose inordinate use of fossil fuels is the principal cause of the crisis. Their commitment to reducing their emissions is the single most important step.

The second question is also hard to answer. Although the revised Montreal Protocol (the London agreement) provides for compensation to developing countries, the Americans, who previously had been the most adamantly opposed to this approach, firmly stated that in accepting it, they did not regard it as a

precedent. Yet the fact remains that by striking a bargain in the ozone negotiations, a deal was reached which included both India and China whose involvement is vital and who up until then had been hold-outs.

Moreover, in Eastern Europe payments by the victims of air pollution will soon be common. Already, Sweden helps Poland with technology to prevent acid rain, while other Western European governments are considering similar arrangements. "They reckon that a dollar spent in Eastern Europe buys far more improvement in air quality than one spent at home."<sup>11</sup> However, clearly if deals are to be struck, the bargaining is going to be very tough.

In the face of these challenges, one knowledgeable observer has offered the following warning.

Unless overwhelmed by a strong and enduring public consensus or by political leadership not yet in evidence, the political processes within and among nations are not likely to bring forth substantial policy action until the uncertainties surrounding climate change are greatly reduced, and probably not until evidence of warming is palpable. This conclusion holds, even though the earth's climate may sustain irreversible changes if some of the forecasts are correct.<sup>12</sup>

Against that rather grim prediction, the only remedy is one offered by the Canadian journalist and filmmaker Boyce Richardson in a recent book with the suggestive title, *Time to Change*. He suggested that the essential ingredient of hope for the global future was "an informed and active citizenry hounding its governments to do what has to be done."<sup>13</sup>

## Endnotes

- 1 Eugene B. Skolnikoff, "The Policy Gridlock on Global Warming," *Foreign Policy*, Summer 1990, p. 77.
- 2 Jim MacNeill, Peter Winsemius, Taizo Yakushiji, *Beyond Interdependence: The Meshing of the World's Economy and the Earth's Ecology*, A Report to the Trilateral Commission, 1990, p. 9.
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- 5 Michael L. Wald, "Guarding Environment: A World of Challenges," *The New York Times*, April 22, 1990, p. A1.
- 6 The two chemicals (methyl chloroform and carbon tetrachloride) are used as solvents and cleaning agents. Participants agreed to reduce methyl chloroform by 70% by the year 2000 and by 100% in 2005. Production of carbon tetrachloride is to be reduced 85% by 1995 and 100% by 2000. *The New York Times*, June 30, 1990, p. A1.
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- 12 Skolnikoff, *op. cit.*, p. 88.
- 13 Boyce Richardson, *Time to Change*, 1990.





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# Protecting the Oceans

## Why are the Oceans Important?

Very simply, life on our planet depends on the oceans. Water constantly evaporates from these vast bodies to become clouds and vapour in the atmosphere. This falls as rain and provides us with the fresh water needed for agriculture, industry and human uses.

The "hydrological cycle" also moves nutrients through the soil, along rivers and into lakes supporting a rich variety of aquatic life. Thus plant life thrives on land and in the sea, feeding animal life and producing the oxygen needed for all animals to survive.

Physically, the seas act as a giant reservoir for heat from the sun. Their movements help moderate the planet's temperatures and shape our climate. Without the atmosphere and the oceans, the effective surface temperature of the world would plunge from the present 15°C to a frigid -25°C. And without water circulation,

the human and industrial wastes that have for generations been dumped into the seas would gradually build up and poison both land and air.

Oceans are also a major source of food and employment and balance of trade. Fish and other aquatic animals account for an average of 17% of the animal protein found in all human diets. Over 30 countries get more than one-third of this protein from seafood — not just nations with huge commercial fishing fleets, but also many developing states in Africa and Asia.

In short, the oceans are a highly productive system which continuously recycles the chemicals necessary for living organisms to survive. However, development in many ways is now threatening the oceans and other seas. The threats are numerous: the unmanaged growth of cities with their large-scale dumping of raw sewage; intensive agricultural practices leading to runoff of fertilizers and feedlot wastes; marine transportation; the destruction of forests; and river basin development are among the assaults.

Although the oceans are vast, they are not infinite in their resources or in what they are able to bear. Change takes place gradually in the open seas and the risks are numerous. The fate of the oceans and the future of our planet are intimately related.

## Why are Coastal Zones Especially Important?

Coastal zones are home to the oceans' bounty. Here microscopic plants and the small animals which feed on them flourish. These zones are the hatcheries and feeding grounds for important fish and shellfish species. They are home for 30,000 species of mollusc and almost all species of crustaceans. Coastal zones have also attracted many varieties of birds, animals and, perhaps the greatest potential threat, human beings.



Seven out of ten people in the world live within 80 kilometers of a coast. Almost half of the world's cities with populations of over one million people are sited in and around the tide-washed river mouths known as estuaries.

It is in coastal zones that humans put the most pressure on the marine environment, where 90% of the world's fish are caught. It is the site of our homes, a major source of food, a favoured place for recreation, and a popular garbage dump. Large numbers of people with their diverse demands on the environment can themselves cause significant unforeseen changes in coastal ecologies.

The Mediterranean, however, provides an illustration of what can be done, at least in theory, to protect coastal areas against the worst excesses of human use and abuse, despite large populations. For over 4,000 years, this sea has been the crossroads of European, Middle Eastern and North African civilizations. It remains highly important today, bordered as it is by 120 cities with a coastal population of at least 100 million and with over 20% of the world's oil traffic crossing its waters.

For years, most of the municipal waste which flooded into the Mediterranean was untreated or inadequately processed. Pollutants such as mercury, lead, used motor oil and pesticides had been found in its waters. By 1975 the situation was considered critical.

That year the United Nations Environment Programme (UNEP) began to shape a plan of action for the Mediterranean by bringing together countries bordering on the Mediterranean and the European

Economic Community (EEC). Protocols were signed against dumping from ships and aircraft and for cooperation in pollution emergencies. Lists of banned substances were established to regulate dumping, while less noxious but still dangerous materials were to be strictly controlled.

Currently, Mediterranean governments are involved in their most ambitious project so far. This involves placing anti-pollution devices in all factories, regular inspections of facilities, and installing pipelines to take sewage out to sea beyond bathing and shellfish waters. By the time the project is completed, it is estimated that the cost will exceed US\$10 billion.

The Mediterranean is far from being the only large body of water to be endangered. UNEP has initiated a Regional Seas Programme which now brings together over 130 states bordering 11 different shared seas around the world. It provides the impetus for bringing governments together to develop a flexible legal framework within which further agreements can be negotiated as needs allow and politics require. No less than 14 UN agencies and over 40 international and regional organizations participate in the world-wide programme.<sup>1</sup>

Nevertheless, although international conventions are important, the fact is that huge investments are needed to roll back land-based pollution in regional seas. All the regulations and international standards in the world are of little use if there is no money or provisions to do effective monitoring of what actually happens. The massive Canada-United

States clean-up of the Great Lakes, which cost \$8.85 billion over 15 years for partial treatment of municipal and industrial wastes, amply demonstrates the financial burden.<sup>2</sup>

### *The Need for Fisheries Management*

After 1970, the expansion of world fisheries, which had begun following the Second World War, levelled off.<sup>3</sup> The average annual increase in catches fell from 6-7 per cent to about 1 per cent as more and more stocks were depleted and fewer new species were brought into the fishery. Over-exploitation threatens many stocks. Several of the world's largest fisheries — the Peruvian anchoveta, several North Atlantic herring stocks, and the Californian sardine — have collapsed.

Concern among coastal states about the depletion of their fisheries was one factor leading to the establishment of the Exclusive Economic Zone (EEZ) under the Law of the Sea negotiations. The EEZ permits coastal states to exercise sovereign rights over the management of national resources, living and non-living, in the waters, sea-bed, and subsoil, up to 200 nautical miles from their shorelines.

The idea behind the EEZ was that coastal states would introduce effective conservation and management measures within the zone in exchange for control of the activities of foreign fishermen there. But industrial countries have been much more successful in doing this than



## International Efforts

## Issues at UNCED

developing countries. In the north-west Atlantic, the annual catch by long-range fleets declined from over 2 million tons before 1974 to about a quarter of a million tons in 1983, while the share of the catch taken by Canada and the United States rose from less than 50 to over 90 per cent.

By contrast, long-range fishing fleets from industrialized countries still catch about 5 million tons annually in developing regions. Lack of local capital, and lack of expertise in things like processing and marketing, has had a debilitating effect on the capacity of developing countries to take advantage of their own resources.

Even in Canada, however, the crisis in the fisheries is clear. Northern Gulf of St. Lawrence cod has fallen drastically in numbers, haddock stocks are at dangerously low levels, and catches of snow crab in the Gulf of St. Lawrence have declined by more than 50 per cent. Consumers see the crisis reflected in availability and prices. For those whose livelihood depends on harvesting the seas or processing the catch, the crisis is much more acute: it can mean the loss of jobs, the destruction of communities, the end of a way of life.

In Canada, the government has responded in several ways. New conservation measures are being developed regarding minimum fish size, mesh size and gear type. Higher penalties are being proposed for those caught fishing illegally, and monitoring, surveillance and patrol activities are to be improved or increased. Canada is also conducting a diplomatic and public information campaign in Europe to influence those nations that persist in overfishing the stocks in international waters which straddle Canada's 200-mile zone. It is hoped that an international regime can be put in place so that stocks will be given the chance to rebuild.

Over the years, an impressive body of international agreements of various kinds has been concluded to deal with one or another of the varied threats which endanger the oceans and marine life. These include a series of agreements relating to oil pollution, the London Dumping Convention of 1972 to control large-scale dumping of industrial waste and sewage in the oceans, as well as conventions to prevent marine pollution from land-based sources.

The 1982 UN Convention on the Law of the Sea provides a comprehensive framework of international law to protect the oceans and seas. It is designed as an umbrella for further global, regional and national actions such as UNEP's Regional Seas Programme which has already been described. The UN system also provides coverage of most environmental issues relating to oceans and seas and an extensive network of coordinating mechanisms such as periodic inter-agency meetings.

Nevertheless, many problems and considerable discrepancies remain. For example, compliance with internationally agreed rules to prevent marine pollution from ships<sup>4</sup> is hampered by a lack of monitoring to measure compliance, as well as effective enforcement and education. Negotiations must be pursued to ensure that existing fishery stocks are equitably distributed among competing interests, so that overfishing is curbed and depleted stocks rebuilt. Gaps in the present legal framework pertaining to oceans and seas must also be identified — a painstaking task in itself because of the wide variety of conventions and agreements in place which cover different geographic areas and different subject matter.

- the need to accelerate monitoring and assessment of the oceans, including the impact of climate change;
- encouraging ratification and adoption of existing treaties (e.g., 1972 London Dumping Convention) and negotiation of new agreements on new problems;
- incomplete coverage, particularly in developing countries, of existing agreements. Such deterioration hits hardest the poorest of the poor, through over-exploitation of fisheries stocks and the destruction of nurseries.

As more and more people expect to live off the resources of the sea and mariculture, the future of our ocean resources will be tied to appropriate controls and management. Monitoring, development of information data bases and international cooperation in setting standards and enforcing them will be essential. It is hoped that the 1992 UN Conference on Environment and Development will give a significant boost to this important work.

## Endnotes

- 1 World Commission on Environment and Development, *Our Common Future*, Oxford, 1987, p. 270.
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- 3 The following discussion owes much to *Our Common Future*, pp. 264–273.
- 4 The most notable example is the 1972 London Dumping Convention (the Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matters) which regulates the disposal of wastes by dumping and incineration at sea.



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# Waste Management

## Waste Management: An Introduction

Along with many benefits, economic growth has brought with it the twin perils of widespread use of chemicals in industry, business and the home and the enormous production of wastes of all kinds. These threats have alarming potential for harming both the environment and human health. All countries face these problems, but some — chiefly as a result of wealth and experience — are far better equipped to deal with them than others. In many poor countries, the rapid growth of cities and industrialization have raced ahead of the government's ability to cope with the sheer magnitude of solid wastes that are generated daily and chemicals over which they have little control.

Chemicals represent about 10% of total world trade in terms of value. An estimated 70-80,000 chemicals are now on the market — although no complete inventory has ever been done and most have never been tested for toxicity. This

situation is beginning to change as some governments move gradually towards a system of testing all new chemicals *before* they come to market.

Most industrialized countries, including Canada, have passed tough environmental laws to deal with both chemicals and wastes. Rigid guidelines are set for the use, storage, and disposal of dangerous and toxic substances, backed up by stringent sanctions. Depending on the severity of the violation, persons not in compliance with these standards can face stiff jail sentences or heavy fines.

## Disparities in International Standards

Unfortunately, there are wide differences in standards between industrialized and developing nations. Legislation protecting the environment is generally much weaker in developing countries because of the higher premium they place on economic growth. For the same reason, technical standards for handling, storing,

and disposing of toxic wastes are usually lower. In addition, most Third World countries lack the resources (laboratories, trained workers) to assess the risks of chemical use and thus they have no way to control chemicals entering their borders that may have been banned elsewhere.

The result is that a number of Third World countries — particularly in Africa — have become dumping grounds for industrial wastes. Unscrupulous corporations, in addition to conducting illegal dumping domestically, also export toxic and dangerous products and wastes abroad. Moreover, legislation has not been entirely effective in reducing the amount of hazardous and toxic wastes being dumped. The Third World is further exploited by deceptive marketing, unsafe operations, and double standards.



In essence, some of the most toxic and hazardous wastes in the industrialized world are being passed on to those countries least equipped to deal with them. The quantity of toxic waste exported is significant and will remain so as long as the trafficking is economically advantageous. As environmental restrictions have increased in Europe and North America, costs for waste disposal have soared. Quite recently, the government of Benin on Africa's west coast was accepting waste for US\$3 a tonne (a metric tonne = 1000 kg or 1.102 tons). In Europe and the United States, incineration can cost as much as \$2,000 a tonne. The Organization for Economic Cooperation and Development has estimated that 2.5 million metric tonnes of toxic waste originate each year in Western Europe alone. So far, laws against these exports have been difficult to enforce.

### Illegal Traffic

The illegal international traffic also includes the export of goods rejected elsewhere as unsafe. Pesticides such as DDT and dieldrin, which are restricted or banned in countries with strict controls, are used extensively in developing countries. The value of such exports from the United States alone is estimated at \$300 million a year. Frequently, these exports are not labelled in the language of the receiving country or they are used by illiterate or barely literate workers. In consequence, although developing countries use about one-fifth of the world's pesticides, they account for three-fifths of global pesticide-related deaths.

The operating principle behind the illegal traffic in hazardous substances seems to be "out of sight, out of mind" — the same principle which allowed the hazardous waste problem to proliferate in buried dump sights nearer to home. Unless high standards are set and enforced, then toxic nightmares like Love Canal are bound to be repeated around the world. It amounts to a high risk game of "juggle the poison" — the problem is not solved; it is merely moved around, leaving the threat to the earth's ecology intact.

### International Agreements

In recent years, some progress has been made in managing the traffic in toxic wastes. More countries are clamping down on how much, if any, waste they will accept. In 1983 the United Nations published a consolidated list (the International Register of Potentially Toxic Chemicals — IRPTC) of products which had been banned, withdrawn, severely restricted, or not approved by governments. It has since been updated twice and now includes annotated entries for some 8,000 trade names.

After a 20-month process, the United Nations Environment Programme (UNEP) succeeded in obtaining the signatures of 116 countries for the landmark Basel Convention or, more accurately, the *Global Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. It establishes four key principles:

- 1) The generation of hazardous waste should be reduced to a minimum at the source.
- 2) Such wastes should be treated as close as possible to their point of generation.
- 3) Hazardous wastes should be shipped only to countries with adequate treatment facilities to deal with them safely.
- 4) The export of hazardous wastes should be controlled by an international management system. This would provide accurate listing and identification of the wastes shipped, and require the prior informed consent of the countries of importation and transit.

Canada signed the Convention in March 1989 and is now engaged in the process of ratification, which consists of ensuring that all domestic regulations are in accord with the treaty. The Convention must be ratified by at least 20 countries before it enters into force.

The European Economic Community also signed an aid and trade agreement called Lomé IV in December 1989 which bans exports of nuclear and toxic wastes to 66 African, Caribbean and Pacific countries.

On the road  
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While international treaties such as these should help reduce the illegal traffic in hazardous substances, they are not enough to satisfy some environmentalists. Greenpeace and other environmental groups have called for a total ban on the export of both hazardous wastes and pesticides. This would require countries to develop and implement improved techniques to treat, detoxify or incinerate hazardous wastes within their own borders.

In the case of Canada and the United States, hazardous wastes currently go both ways and are regulated by a 1986 agreement. This bilateral agreement is based on the principle that such wastes should be treated at the nearest licensed facility, so as to minimize the distances they must travel to ensure their environmentally sound disposal. Canada does not support any bans on exports or imports of hazardous wastes, in particular those destined for recycling operation. The Canadian position is based on the following reasons.

- For economic and environmental reasons, the use of treatment facilities should be rationalized. This includes the possibility of countries agreeing bilaterally to enable hazardous waste generators to access the nearest facilities, regardless of international boundaries.
- Imposing such a ban would create a climate that would encourage illegal movement.
- Environmental and economic objectives must be balanced, particularly for hazardous recyclables.

### Future Progress

The World Commission on Environment and Development, better known as the Brundtland Commission, recommended in its 1987 report, *Our Common Future*, that all governments should:

- undertake that no new chemicals be placed on international markets until the health and environmental impacts have been tested and assessed;
- reinforce on-going efforts to obtain international agreement on the selection of existing chemicals for priority testing, on criteria and procedures for their assessment, and on a system for international sharing of the tasks and the resources required;
- strictly regulate the export to developing countries of those chemicals for which authorization for domestic sale has not been sought or given, by extending requirements for prior notification and information exchange to them; and
- support the establishment in existing regional organizations of units qualified to receive such prior notification and information, to assess it and to advise governments in the region on the risks associated with the use of these chemicals, in order to permit individual governments to weigh these risks against benefits they may perceive from importation of the chemicals.

The UN system through its agencies and programmes is striving to put these proposals into effect. Some of their efforts have already been described. In addition, UN agencies are collaborating on health and environmental risk evaluation of chemicals and pesticides, on technologies for waste minimization, treatment and disposal, and on the prevention of an emergency response to technological accidents.

### Issues at UNCED

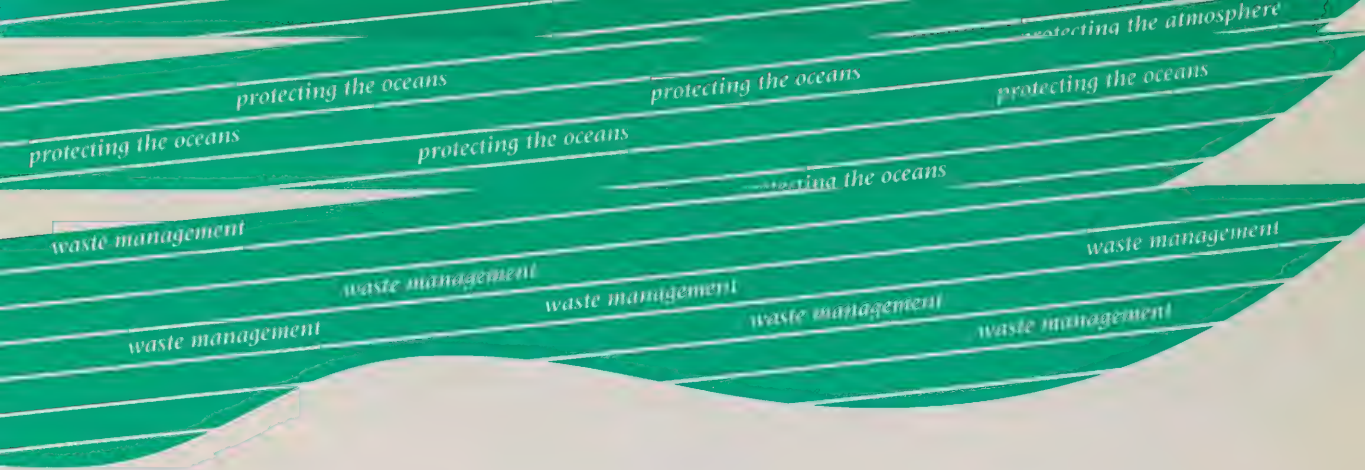
It is hoped that the 1992 UN Conference on Environment and Development will be able to address the following major gaps:

- safe management of chemicals, including pesticides, as an integrated concept;
- coordination throughout the international system to cover the issues and activities in solid waste management effectively and to monitor the efforts in developing countries;
- site selection of a facility for the disposal of high-level radioactive waste;
- the need to strengthen existing guidelines or conventions.

A key element is consumer awareness about chemicals through clear packaging and labelling in local languages and through greater efforts by governments, business and non-governmental organizations to inform consumers fully of the dangers. With respect to wastes, the objective must be to reduce the amount generated and to transform more and more into resources for use and reuse.

All of these goals will involve painstaking and on-going negotiations by governments. But in order to lay the ground for progress to be made — and to sustain progress on any advances — people, and capitalize on any advances — people, through organizations, at the ballot box, and as individual voices, must demonstrate their commitment and determination. What is needed, as Canadian writer and filmmaker Boyce Richardson wrote in his recent book, *Time to Change* is “an informed and active citizenry hounding their governments to do what has to be done.”





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# Land Resources

## Land Resources : An Introduction

One of the major global challenges is to produce more food, pure water, fibre and timber for rapidly growing populations. Several factors, however, make this challenge seem overwhelming. One is the surge of more and more people and their spiralling demands on the land. Another is inappropriate farming systems such as the use of hillsides that are ill-suited to cultivation. A third is poorly designed irrigation systems over the last couple of centuries which have led to increasing salinity of the land. And finally, there is the potentially devastating effect of climate — witness the series of dry years in the Sahel region of Africa during the 1980's.

All of these factors have been major causes of land "degradation" — that is, soil erosion, the spread of deserts, the destruction of forests, and other abuses of land resources. Moreover, the degradation of the natural resource base (soils, range-lands, forests and water) appears to be

increasing. If this trend continues, the consequences for agriculture, forestry and whole economies could be highly negative. The aim must surely be to ensure that these sectors remain not only productive, but indeed, increase their productivity.

## Soils and Farming

According to the UN's Food and Agriculture Organization (FAO), 60% of the people of the Third World make their living directly from farming. The proportion reaches 70% in Africa and 75% in Asia. These farmers' ability to feed themselves and to earn additional monies to improve their lot is critical to the survival of entire societies.

The challenge is enormous. First, the number of mouths to feed is growing steadily. Global population by 2025 is expected to be twice that of 1980. Second, farmers must grow their crops on roughly the same amount of land since most of the world's arable land is already under the plough or pasture. Yet as agriculture

around the world becomes more intensive and as ill-advised agricultural practices such as monoculture persist (when the same crop is planted year after year), land becomes increasingly vulnerable to erosion.

Grasslands become deserts when vegetation growth is reduced to a minimum. Desertification — the making of more desert — is the result of droughts, less rainfall than usual, overuse (too much cultivation and grazing), or wind patterns. In Africa, where the numbers of both people and animals have exploded, overgrazing in some countries is thought to exceed the carrying capacity of the range by 100 per cent. As more and more land is brought into permanent cultivation, the pastoral herding people are forced into marginal lands. Meanwhile, the desert swiftly advances: according to the UN Environment Programme (UNEP), in the early 1980s out of a total of 473 million hectares of productive drylands in Sudano-Saharan Africa, 88% was classified as desertified.<sup>1</sup>



In Central America, the problem of too many people on too little land is compounded by perverse patterns of land use and distribution. Typically, the richest farmland in the river valleys is used as pasture for cattle — land that is much better suited to basic crops for domestic consumption. Meanwhile, the small, land-poor farmers are driven either to cultivate hillsides or to cut down more forests. But the uncovered hillsides are more susceptible to erosion and soils wash away in a few years, while tropical forest soil is rarely suitable for intensive or prolonged cultivation. So the small farmers are obliged to move on, carrying their destructive habits with them.

In Asia, although the causes may be different, the consequences are depressingly similar. Loss of vegetation in India has meant that the area subject to flooding has doubled in 10 years. This is because there is no holding capacity on the land surface to slow the runoff and the soil that accompanies it, and also because the build-up of soil in riverbeds causes the rivers to rise to higher flood levels. Siltation has also impaired the efficiency of hydroelectric and irrigation dams.

The North American plains produce huge amounts of food, mostly for export, leading to their description as the “bread basket of the world.” But they are losing their natural fertility as a result. Much of the land currently in production is subject to erosion, especially during prolonged droughts. The possibility of a drier climate in this region has encouraged the Canadian and U.S. governments to make plans to remove the most endangered areas from production, but an integrated land-use strategy, which would provide long-term solutions, remains elusive.<sup>2</sup>

## Forests

Forests have been described as the hearts and lungs of the world. Their heart-land description arises from the fact that most river systems originate in the forest. Forests prevent soil erosion, maintain high water quality, and regulate the flow of water in different seasons, thus providing the bloodstream of agriculture, industry and human communities.

Trees are compared to lungs because they “inhale” carbon dioxide and “exhale” oxygen. Through the process of photosynthesis, the carbon from carbon dioxide in the air is “fixed” (or converted to solid matter) and becomes a part of forest biomass (wood, bark, and leaves). This is an important element in the global carbon reservoir.

Forests also filter particulate pollution from the air, and improve local and regional climates. When rain falls on a forest, as much as 80% may be returned to the atmosphere by evaporation directly or through the leaf systems. Fundamentally, the forest acts as a sponge or a protective cover which stops rain from falling directly on bare land, and thereby causing excessive erosion.

Particularly in the tropics, forests are a major source of global genetic diversity. Although tropical forests cover roughly nine per cent of the world's land area or 1.2 billion hectares, they contain over half the known plant and animal species, including 80% of the insects and 90% of the primates.

Tragically, the world is facing serious declines in forest cover. In a recent report, FAO found that annual tropical deforestation had increased from 9 million hectares in 1980 to 16.8 million in 1990. As population continues to expand, all the world's forests are threatened.

There are a number of reasons for this crisis. One is the pressure on land: small farmers in poor countries “slash and burn” forest land in order to produce more food and cash crops. This practice is doubly destructive since usually these farmers do not even gain any money from the trees felled. Furthermore, tropical forest soils are often unsuited to agriculture and the agriculture is not sustainable for more than a few years. Land conversion to other uses is the major problem in most developing countries. In Brazil, for example, the vast majority of Amazonian deforestation is due to land conversion.

Trees are also cleared for fuelwood. Wood provides over 80% of the energy needs of Africa. According to FAO, the annual rate of fuelwood consumption now exceeds the rate at which tree stocks are either regenerating or being planted by about 30% in Africa.<sup>3</sup>

The consequences are already serious and potentially catastrophic. Indiscriminate forest removal on watersheds has had disastrous results: loss of soil and land productivity, sedimentation of irrigation systems and turbines, and flooding in the plains. Large-scale forest clearance also may have had a devastating impact on global genetic diversity, and on gene pools of individual species.

The greenhouse effect is also partly owing to deforestation. The earth is now warming because of an increase of carbon dioxide in the atmosphere. Forests store more carbon than any other vegetation on land. Deforestation means fewer trees are exhaling oxygen which, therefore, increases the proportion of carbon dioxide in the atmosphere. The burning of wood as fuel makes the situation worse by increasing carbon dioxide emissions. Destruction of forests over past centuries has contributed substantially to the total increase in atmospheric carbon dioxide concentration. Currently, it contributes to between 15–20% of the total greenhouse effect.<sup>4</sup>

### *Solutions?*

There are many remedies available to combat desertification and many policies that will promote the sustainable management of land resources. The challenge is to put them into effect. For sensible as these alternatives may seem from a distance, their implementation on the ground frequently runs counter to entrenched economic interests, traditional customs, political inertia and a host of other obstacles.

The World Commission on Environment and Development, better known as the Brundtland Commission, observed that poverty itself is a major global scourge:

Environmental stress has often been seen as the result of the growing demand on scarce resources and the pollution generated by the rising living standards of the relatively affluent. But poverty itself pollutes the environment, creating environmental stress in a different way. Those who are poor and hungry will often destroy their immediate environment in order to survive: they will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities.<sup>5</sup>

On the other hand, conserving the agricultural resource base has three huge benefits. First, secure resources and reasonable living lead to good husbandry and sustainable management. Second, migration from the countryside to cities is eased and less food is imported from abroad. Third, by putting money in Third World pockets, population growth is slowed.<sup>6</sup>

Since the end of World War II, the number of cattle in the Sahel has increased five fold. This can be traced to the fact that the new countries nationalized land and did not allow the local population to participate in the decision-making process on how it would be used. Prior to that, each village owned or had the rights to the land. The elders made the decisions on how the land would be used and the livestock it could support. Indigenous knowledge such as this is the single best solution to land degradation. Land should be returned to the villages with the villagers themselves regulating its use.

A more sophisticated but also more costly approach is for developing countries to classify land for different uses, depending on "best use" criteria. This means taking an inventory of all the land in a country, which satellite monitoring and other new technologies make more feasible. This, combined with full public discussion and political will, would permit differentiation of infrastructure, support services, fiscal subsidies and other incentives, and regulations — depending on how the lands are designated.

At the same time, a delicate balance must be maintained for forests between sustainable development and conservation. Once again, sound policies must be based on scientific analysis of the capacity of forests and their soil to perform different functions, along with the involvement of local people who are both "victims and agents of destruction and who will bear the burden of any new management scheme."<sup>7</sup>

For example, forestry can be extended into agriculture. One or more tree crops can be combined with food crops or animal raising on the same land. The agroforestry approach has been practised by traditional farmers everywhere: it is especially appropriate for small farmers and low quality lands. The challenge is "revive old methods, improve them, add them to new conditions, and develop new ones."<sup>8</sup> On the other hand, agroforestry is not a panacea: while it can make important differences, the fact remains that there is no system at the present time that will be able to feed the predominant urban world of the year 2000.

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## International Efforts

Different international mechanisms have been tried with limited success. A UN Plan of Action to Combat Desertification (PACD) was drawn up in 1977. It had three objectives: 1) to stop and then reverse the environmental processes of desertification; 2) to put in place ecologically appropriate, productive and sustainable land uses; and 3) to secure the social and economic advancement of the people affected.

Yet so far PACD is an almost unqualified failure. Combatting desertification has no immediate payoff; it is a long-term process. Both potential donor countries and recipients tend to favour projects with more immediate economic development goals. Moreover, the lack of attention to PACD may also reflect the fact that desertification affects the poorest and least politically powerful people in a country. Unless the catastrophe is both large and upon us — as in the Sahel — governments will not commit large amounts of money to programmes that have a high risk of failure.<sup>9</sup>

Somewhat different criticisms apply to the Tropical Forest Action Programme (TFAP), which was jointly created by the UN Development Programme, FAO, the World Bank and the World Resources Institute in 1985.

TFAP imposed a uniform, "top-down" planning process involving legions of foreign consultants who often had inadequate knowledge of the diverse countries' forestry institutions or practices, much less the economic, social and cultural conditions underpinning forest use. Moreover, since the planning process was almost entirely dominated by foresters, little attention was paid to the fact that virtually all deforestation in the tropics has been caused by agriculture.

A public outcry led by non-governmental organizations resulted in several reviews of TFAP and a major meeting in Geneva in March 1991 to try to thrash out a new structure that permits local people to have greater control over their own resources. A recent issue of *The New Scientist* magazine noted that the challenge is "for governments, citizens' groups, forest dwellers, conservationists, timber companies and foresters to put their heads together to devise, for their country, a management plan that satisfies all who have an interest in the forest." Sadly, "achieving that all-important dialogue has proved to be almost impossible."<sup>10</sup>

The Food and Agriculture Organization is playing an active role in providing analytical support and developing ideas for such a convention. It is hoped that negotiations to prepare a convention will be opened by member countries as soon as possible. This would be the first in a two-step process: first, a country signs a convention or another form of legal instrument, which signals its intention to ratify; then, the country proceeds to bring its domestic laws into accord with the provisions of the instrument, at the conclusion of which ratification can take place.

## Issues at UNCED

- increased aid from developed countries to combat soil degradation, deforestation and desertification by means of increased research, extension and money;
- sustainable alternatives to shifting cultivation that would be acceptable to small farmers;
- identification of economically viable soil and water conservation techniques, geared toward the needs of small farmers;
- sustainable development of dryland areas with high populations, including alternative or supplementary means of livelihood;
- strategies to alleviate deforestation and desertification caused by the conglomeration of refugees and their livestock in environmentally fragile areas;
- the development of national soils policies to encourage sustainable agriculture practices in the developing world.

The 1990 Houston Summit of the Group of Seven leading industrialized countries called for a convention on tropical and temperate forests to protect biodiversity and to reflect concerns about climate change. If all goes well, an International Convention on Forests could be one of the most significant accomplishments of the UNCED.

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## Canadian Approaches

At the national level, in 1987 the Canadian Council of Forestry Ministers (representing both federal and provincial ministers) adopted, after broad public consultation, a National Forestry Sector Strategy. At the last meeting of this Council in October 1990, it was agreed to revise the strategy. A series of regional forums is being held during 1991 in order to consult as widely as possible, with the ultimate objective being a renamed National Forest Strategy ready for adoption at a National Forestry Congress to be held in Ottawa in March 1992. This process will allow Canada to prepare internally for whatever obligations may be undertaken in agreeing at UNCED to a global convention or other kinds of legal instruments on forestry.

As for agriculture, the Canadian position is characterized by a dual approach. On the one hand, it is recognized that, in the short-term, developing countries will be obliged to practice non-sustainable agriculture if they are to meet the daunting challenge of feeding their rapidly growing populations. On the other hand, Canada is determined to seek commitments from developing countries that they will prepare national soils policies which will gradually move their agriculture towards sustainable practices in the longer-term.

Canadian diplomacy at the UNCED and in the preparations leading up to it could play a vital role in building bridges between different national delegations on the complex interrelationship between diverse land uses and sustainable land management. How we use or abuse the soil is fundamental to how we view ourselves and the earth we inhabit.

## Endnotes


- 1 The World Resources Institute and the International Institute for Environment and Development, *World Resources 1988-89*, New York, p. 291.
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# Biological Diversity

## Biological Diversity: An Introduction

From the depths of the ocean to the snow-capped mountain peaks, our world teems with life. A startling variety of plants, animals, and micro-organisms coexist in complex, interlocking ways in a wide range of natural habitats. No one is even sure how many different species of living organisms share the earth with us. About 1.7 million species have been formally named, but there could be as many as 30 million other species which have not yet been identified!

Within each species, there is further diversity measured by the variation in genes among the members of a population. It is this genetic variation which

determines that some roses will be red and others yellow, that some chickens will be best for producing meat and others eggs.

Biological diversity — genetic variation, the number of species, and the different ecosystems in which they coexist — is among our greatest treasures. Yet, in spite of world-wide conservation efforts, our biological resources are being lost. Delicate ecosystems, damaged by acid rain, waste disposal, and deforestation, are losing their ability to sustain life. Overharvesting and killing of some species compounds the problem. Indeed, if present rates of extinction continue, a quarter of the world's species will be gone by the end of the century.

## Why is Biological Diversity Important?

For many conservationists, there is an ethical imperative to protect all of the various biological resources of the earth. Beyond consideration of our role as human stewards, however, there are more pragmatic reasons why biological diversity is important.

In terms of agriculture, for example, the existence of genetic diversity offers the opportunity to improve strains of crop plants and livestock and to develop "new" crop species. In the United States, the U.S. Department of Agriculture attributes \$1-billion annually of increased crop productivity to the introduction of genetic characteristics from wild species into major crop plants.



The diversity of wild plant and animal species also provides enormous potential for both the development and testing of new drugs. Already more than a quarter of all prescription drugs are made from organic substances that originate in rain forests, the location offering the greatest biological diversity.

In addition, places such as parks, reserves and wildlife refuges, where people go to see wild species and other natural features, contribute enormously to the economy. Recent studies have found that wildlife-associated recreation accounts for billions of dollars spent in Canada each year. The potential of developing countries to attract foreign exchange by promoting "ecotourism" is beginning to be realized, but much more can still be done.

Perhaps the most important reason for conserving biological diversity is that all life, including human life, depends on keeping the planet healthy. All living things interact with their environment in an interlocking way, such that the fate of one species is closely tied to that of others. We rely on our environmental resources for many benefits which we often take for granted — the biologically mediated recycling of nutrients, purifying of water, flood control, breakdown of pollutants, protection of soil, fixation of solar energy, and other life-sustaining functions.

Whenever biological diversity is lost, the overall system is stressed as it attempts to balance the new equation. Even a small change can have complex and unpredictable results. The loss of one species, for example, could trigger an increase in other species which use the same resources, or it could lead to decreases in species which preyed upon it. Considering the limitations of our existing knowledge, can we afford to squander biological resources which may be useful or even essential?

### *What Threatens Biological Diversity?*

Despite efforts to increase awareness of the need to conserve biological diversity, many organisms continue to be exposed to a variety of human-caused threats. The most serious of these is habitat alteration, often related to land-use changes on a regional scale which involve massive reductions in natural vegetation.

Such reductions inevitably result in population declines of indigenous species, with a corresponding loss in genetic diversity and an increase in vulnerability to disease, hunting, and random population fluctuations.

Most circumstances of habitat alteration can be traced back to human population increases. As our population has increased, forests have fallen and wetlands and marshes have been lost in order to provide new land for raising crops and livestock or for urban development.

In forests where large areas have been cleared to provide fuel wood and timber, natural regeneration may not occur because seed sources may not be available and soils may have been degraded. This is particularly true in tropical forests, where climax species have large and poorly dispersed seeds, where close interdependence with micro-organisms is probably common, and where nutrients are rapidly leached from exposed soil. The result is soil loss, droughts, floods, disrupted water supplies, and a legacy of unproductive land.

In the oceans, coral reefs are under severe assault. These fragile, species-rich ecosystems are threatened by extensive mining for concrete production and the commercial collection of coral.

But biological diversity is threatened not only by outright physical destruction of habitat. Many habitats have been seriously polluted and degraded through chemical contamination and improper waste disposal.

Excessive commercial harvesting has caused the virtual elimination of several species. Whenever individuals are taken at a higher rate than can be sustained by the natural reproductive capacity of the species, there exists the danger of loss of biological diversity.

Another important factor is climate change, often related to changing land-use patterns. The global warming of the "greenhouse" effect will certainly have a serious impact on many ecosystems.

### *What Can Be Done?*

Governments have adopted numerous measures to address different aspects of the problem, including national conservation programmes, international conventions, and other instruments. In Indonesia, for example, fines have been imposed and forestry licences revoked if companies are caught cutting trees smaller than the law allows, or if they overharvest the forests. Australia wants to have its remaining rain forests included on UNESCO's World Heritage List, which would oblige the country to "preserve, conserve, and rehabilitate" forests and make them off-limits to development.

In the late 1960's, India was faced with a massive hemorrhage in its tiger population because expanding human populations were encroaching on and destroying the tiger's last sanctuaries. India rose to the challenge and launched Project Tiger in 1972.

International conventions were drafted and national laws were passed to protect the tiger, which became a symbol for all of the natural riches of wildlife and wild-lands in the sub-continent.

Special tiger reserves were declared. More and better trained and equipped staff were put in place to manage these precious resources. Economic planners faced the challenges associated with creating the tiger reserves and the surrounding forest areas as positive features in regional land-use and economic advancement programs. No longer could clearing the jungle and killing tigers be considered the mark of progress it once had been.<sup>1</sup>

Unfortunately, there is no comprehensive international programme for the conservation and use of biological diversity. Existing programmes are fragile, poorly funded, and fail to address economic realities which lie at the heart of the problem.

The sad truth is that the areas with the greatest biological diversity are those with the fewest economic resources to implement conservation programmes. Developing countries are facing immediate demands that often lead to massive debts. For biologically rich, economically poor countries like Zaire, Burma, and Indonesia, the need for resources to generate income for increasing populations has become a major priority.

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## International Efforts

The conservation of biological diversity is the aim of a number of international conventions. These include the 1946 International Convention for the Regulation of Whaling (to protect all whale species from overhunting and to establish a system of conservation), the 1971 Convention on Wetlands (to stem the progressive encroachment of wetlands, recognizing their fundamental ecological importance), the World Heritage Convention of 1972 (to promote conservation and preservation of heritage sites), the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the 1979 Convention on the Conservation of Migratory Species of Wild Animals (to protect those that migrate across or near national boundaries).

The United Nations family of agencies also strives for the conservation and utilization of biological diversity through improved knowledge, assessment and monitoring of genetic resources and ecosystems. To this end, the UN seeks to encourage appropriate national and international tools and mechanisms.

International and UN efforts are guided by principles embodied in the several key documents, among them the World Charter for Nature of 1982 and the World Conservation Strategy of 1980. The Strategy, which brought about a turning point in thinking about economic development and protection of the biosphere, was commissioned by the UN Environment Programme and prepared by three leading international non-governmental organizations.<sup>2</sup>

The Strategy makes conservation a primary policy concern of all economic sectors in government rather than that of one separate department. It designs environmental policies that can "anticipate and prevent" rather than "react and cure."

National actions would conserve renewable resources like fisheries, forests, and cropland; protect natural areas; and control pollution. International actions would protect the "global commons": the atmosphere, the oceans, and the continent of Antarctica.

Unfortunately, the Strategy lacked any provision either for promotion or for monitoring progress. Perhaps as a result, it is being applied in a rather piecemeal fashion. Some countries have endorsed it, but by and large, it is individuals and organizations that have responded to its objectives and who use it as a blueprint and checklist for policy development.

However, nearly ten years after its publication, there are 54 other strategies under way or completed in 41 countries and the International Union for the Conservation of Nature — which helped to write the original Strategy — is setting up a data base to keep track of them.

The adoption and launching of the second World Conservation Strategy is one of the most important items on the international agenda relating to biological diversity prior to the 1992 UN Conference on Environment and Development (UNCED) in Brazil. One of the priorities of the new Strategy will be to improve coordination and implementation of the various conservation conventions, agreements, strategies and action plans.

## The Brazil Conference

The UNCED itself is expected to provide the opportunity to adopt an international framework legal instrument on biological diversity. Already the negotiating process towards a convention has been launched under the auspices of the UN Environment Programme. This process is strongly supported by Canada; a convention on biological diversity could be one of the UNCED's most significant accomplishments. At the same time, it is hoped that the UNCED will also launch international legal instruments on climate change and on forests, both of which would also have significant impact on world-wide biological diversity.

### Issues at UNCED

UNCED may address a number of gaps that can be summarized in the following key points:

- a worldwide assessment is needed of biological diversity in order to understand better the current situation and trends, and the policies that are required;
- a comprehensive national and international action plan is needed to conserve existing biological diversity;
- better knowledge is needed of the economic value of biological diversity and genetic resources;
- action is urgently needed to protect tropical forests which are inhabited by about 70% of the world's species, specifically:

- the Tropical Forestry Action Plan remains seriously under-funded;
- deforestation remains a major scourge, with government policy in many countries continuing to encourage the widespread clearing of forests, either deliberately or inadvertently;

— an integrated approach is needed which strikes a balance between the needs of local populations and the protection of genetic resources.

The conservation of biological diversity is mostly about the activity and behaviour of men and women. In order to change this behaviour for the better, the fundamental perception which must be corrected at the UNCED is the delusion that impoverished countries earn greater immediate benefits from exploiting their resources than they do from conserving them.

The challenge is to educate decision-makers and involve grassroots communities so that they realize conservation does not mean non-use, but instead, use which preserves and enhances the resource. Looked at in this way, conservation of biological diversity becomes a means of economic development and, above all, a way of sustaining planet earth.

### Endnotes

- 1 This excerpt is taken from a review of a new book entitled *Tigers: The Secret Life* by Valmik Thapar. The review appeared in *The New York Times Book Review*, August 26, 1990, p. 3.
- 2 The following section on the World Conservation Strategy draws heavily from Constance Mungall and Digby J. McLaren, *Planet Under Stress*, The Royal Society of Canada, 1990, p. 207.

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# Biotechnology

## Biotechnology: An Introduction

Our planet is home to literally millions of life forms, many of which are too small to be seen by the naked eye. Humans have routinely used these microorganisms, or microbes, to improve their quality of life since the dawn of time. A simple meal of bread, cheese, and beer, for example, is only possible because of the activities of microbes which turn milk into cheese, produce gases to make bread rise, and convert the sugar in barley into alcohol.

In recent years, as our knowledge of this microscopic world has increased, biotechnology — or the practical utilization of microbial, plant and animal cells — has emerged as a technique capable of conferring tremendous benefits on humanity: increased food production; reduced dependence on artificial fertilizers and pesticides; improved health by creating and mass-producing new drugs, antibiotics,

and hormones; pollution control by harnessing microbes which can consume harmful wastes; and increased industrial capacity.

There are four basic types of biotechnology: *genetic manipulative*, or recombinant DNA technology; *cellular manipulative*, or the creation of specific substances through the fusion of normal and abnormal cells; *fermentative technology*, or the large scale growth of living organisms and the removal or extraction of substances as a result of this growth; and *enzyme technology*, or the production of substances that have the capacity to enhance chemical reactions and form any number of resulting products from various substances.

Each of these techniques offers countless opportunities for the improvement of life on Earth. Genetic engineering is the most spectacular facet of biotechnology, permitting the manipulation of the basic building blocks of life to produce desired characteristics at the cellular level. It is only within the last 20 years that scientists have discovered they could graft totally foreign pieces of genetic information into microbes to create new

life forms. In laboratories around the world, genetic engineers have already designed microbes to manufacture dozens of potentially invaluable substances, such as insulin and new drugs to combat viral diseases.

But other biotechnological techniques have been equally significant. Cellular manipulative research, for example, has opened up the possibility of creating new crops which will grow more rapidly and require less fertilizer.

The exciting possibilities inherent in biotechnology arise because of the incredible diversity of microscopic life. Microbes can be found almost everywhere, even in the most inhospitable of environments, such as ice, oil, and boiling water. In addition, some can feed on apparently non-nutritious materials, such as plastic, oil, even solid rock. This ability means microbes could be used to clean up waste oil spills or to eliminate plastic waste, something which in the absence of biotechnology is virtually non-biodegradable. Microorganisms have also been used to leach metals, such as uranium and copper, from low-grade ores.



## Can Biotechnology Be Dangerous?

The potential risks, for example, posed by grafted genetic material escaping uncontrolled into wild organisms by gene transfer processes that occur naturally in the environment need evaluation before any project is undertaken. The socio-economic and environmental risks and benefits must also be evaluated in every instance.

There are many problems that make the successful development of a biological weapon far from simple. However, the fact that research and development is still permitted for defensive purposes, and the fact that verification processes are difficult, continue to make this an area of international concern.

## Biotechnology and the Third World

For years, wild plants and seeds have been collected freely by researchers and crossbred with crops. A Turkish variety of wheat helps give stripe-rust resistance to North America's wheat crop. An Ethiopian gene helps protect the barley crop from disease. Plant substances have been the ingredients or inspiration for more than one-quarter of modern drugs. The National Cancer Institute in the United States alone collects thousands of plant samples each year from Asia, Africa and Latin America in its search for new cancer drugs.

The countries from which such plants are obtained have rarely been compensated, since the specimens have been treated as part of the common heritage of mankind. Lately, however, the concept of property rights for plants has been gaining ground. Some nations are beginning to restrict access to wildlife samples or to demand compensation for their genetic resources as they do for mineral resources.<sup>1</sup>

Another major consideration is the impact of biotechnology on local economies. Biotechnology could erode the livelihoods of traditional producers by the development of substitute products and processes from genetic materials taken, in some instances, from those very countries.

In Kenya, for example, the government withdrew its support in 1982 for biotechnology programmes creating fuel alcohol because the main raw ingredients consumed were basic food crops. Food imports soared during the period the Kenyan government supported these programmes. On the other hand, although the use of food crops for the production of fuel alcohol may result in food shortages, the possibility of harder crops grown on previously barren land ultimately would have the opposite effect. The long-term effect of these opposing market forces can only be guessed at; in the short-term, however, biotechnology can have detrimental effects on local and national economies and can present governments with significant dilemmas as they seek to limit the damage to their populations.

As biotechnology research advances, the world economy will be buffeted again and again by conflicting forces. As mortality rates drop due to new medicines, populations will rise, creating greater needs for energy, food, and fresh water.

## United Nations Efforts

The United Nations seeks to monitor the work of the many private, public and international organizations which are involved with some aspect of biotechnological development. The UN's family of agencies provides a variety of services relating or exploring biotechnology's interconnections with agriculture, health, industry and the environment. Through these agencies, environmental management programmes, agricultural and food production and safety systems, and the work of microbiological research centres around the world are examined and enhanced. The emphasis is on technical assistance, accelerated technological research, special training and dissemination of information.

Building on on-going work in the Organization for Economic Co-operation and Development, an inter-agency informal working group on safety in biotechnology has been set up under the auspices of the UN Industrial Development Organization, the UN Environment Programme, the World Health Organization and the Food and Agriculture Organization. It is seeking to speed the elaboration of basic safety guidelines and to prepare an international code of conduct. Its work is central to the process of preparing for UNCED itself, which will be seen by looking at the main issues at UNCED.

## Issues at UNCED

- elaboration of basic guidelines on safety in biotechnology;
- facilitating the preparation of an international code of conduct;
- assisting in the preparation of an international legal instrument on biological diversity.

Many new developments in biotechnology are not fully appreciated (especially in all of their possible ramifications) by either governments or the public. In general, work undertaken without sufficient regard for the balance of nature, or with economic profit as the sole motive, usually brings disaster of one sort or another as a consequence.

The bottom line is that regulation, controls, and education are all important elements in any biotechnology strategy. Mishandled, any new discovery could be an environmental and economic disaster, rather than the blessing it may appear to be at the outset.

*On the road to*  
**Brazil**



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*The living and working conditions of the poor and human health and the quality of life.*

**issue 2 Protecting the Atmosphere**

*Protection of the atmosphere by combating climate change, depletion of the ozone layer and transboundary air pollution.*

**issue 3 Protecting the Oceans**

*Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and of coastal areas, and the protection, rational use and development of their living resources.*

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*Genetic resources, wildlife areas, and biological diversity.*

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*Protection of the quality and supply of freshwater resources.*

**issue 8 Biotechnology**

*Environmentally sound management of biotechnology.*

This issue paper is part of a series, "Notes on the Road to Brazil," which seeks to inform Canadians about the key issues that will be under negotiation at the forthcoming United Nations Conference on Environment and Development (UNCED), to be held in Brazil in June 1992. The series is published by the United Nations Association in Canada under the general editorship of Gregory Wirick, an Ottawa-based writer and consultant on international issues. The views expressed in this series do not necessarily reflect those of the United Nations Association in Canada. Additional copies may be purchased from the UNA-Canada, 63 Sparks Street, Suite 808, Ottawa, Ontario K1P 5A6. ©

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### A Word about UNCED

*On December 22, 1989, in the closing moments of the 44th Session of the United Nations General Assembly in New York, the Assembly passed resolution 44/228, by which it decided to convene the United Nations Conference on Environment and Development (UNCED). The conference that will be held in Brazil will be of two weeks' duration, its opening to coincide with World Environment Day on June 5, 1992. The Conference was called because of the Assembly's deep concern about "the continuing deterioration of the state of the environment and the serious degradation of the global life-support systems, as well as by trends that, if allowed to continue, could disrupt the global ecological balance, jeopardize the life-sustaining qualities of the Earth and lead to an ecological catastrophe..."*

*Because of the enormous difficulties of organizing an event involving virtually every national government in the world, any UN conference is a remarkably complex undertaking which includes a lengthy and highly important preparatory process. In many cases, these preparations are more significant than the final conference itself since it is during this period that government officials are obliged to shape their own national policies and positions and to begin the process of negotiating with their counterparts in foreign countries. The UNCED is no exception to this rule, although it is possible that the process leading to the Brazil conference may be still more complex than usual, owing both to the broad scope of the conference agenda and to the high expectations felt by much of the public concerning environmental questions.*

*The UNCED is the first UN conference covering the entire sweep of environmental issues since the 1972 Stockholm Conference on the Human Environment. Thus one of the objectives will be to review the current state of the environment and the changes that have occurred since Stockholm. Among the most significant differences between the Brazil preparations and Stockholm is the new emphasis that is being laid on the linkages between environmental degradation and socioeconomic development. The initial General Assembly resolution establishing UNCED noted: "that the major cause of the continuing deterioration of the global environment is the unsustainable pattern of production and consumption, particularly in industrialized countries." It also stressed "that poverty and environmental degradation are closely interrelated and that environmental protection in developing countries must, in this context, be viewed as an integral part of the development process..."*



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